



Global IPv6-related Organizations

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Overview

- IPv6 Standardization Bodies
- ICANN
- IANA
- Address Allocation



Global IPv6 Standardization Bodies



- Internet Engineering Task Force (IETF)
 - Defines all IPv6 protocol standards (“RFCs”)
- Regional Internet Registries (RIRs)
 - Defines IPv6 address allocation “standards” (policies) via a “bottoms-up” fashion
- Internet Service Providers (ISPs)
 - Discuss operational practices for IPv6 in network operators’ fora, e.g. APOP, NANOG, AFNOG, etc.
 - Sometimes documented in IETF OPS area working groups

Other Global IPv6-related Bodies



- IPv6 Task Force
 - Geographically oriented technical forums for IPv6 related issues, “assisting in IPv6 production-level deployment and promotion in [regional and national] economies”
 - IPv6 Task Force exist in IE, UK, BE, FR, ES, PT, IT, CH, AT, DE, PL, DK, LU, IL, FI, MT, NL, RU, EG, SN, TN, AE, IN, CN, JP, KR, TW, PH, MY, SG, AU, NZ, TH, PK, MX, CU, PA, CO, PE, BR, AR, CA, US
- IPv6 Forum
 - Industry Trade Group formed to promote IPv6

ICANN



- *“ICANN is responsible for the global coordination of the Internet's system of unique identifiers.”*

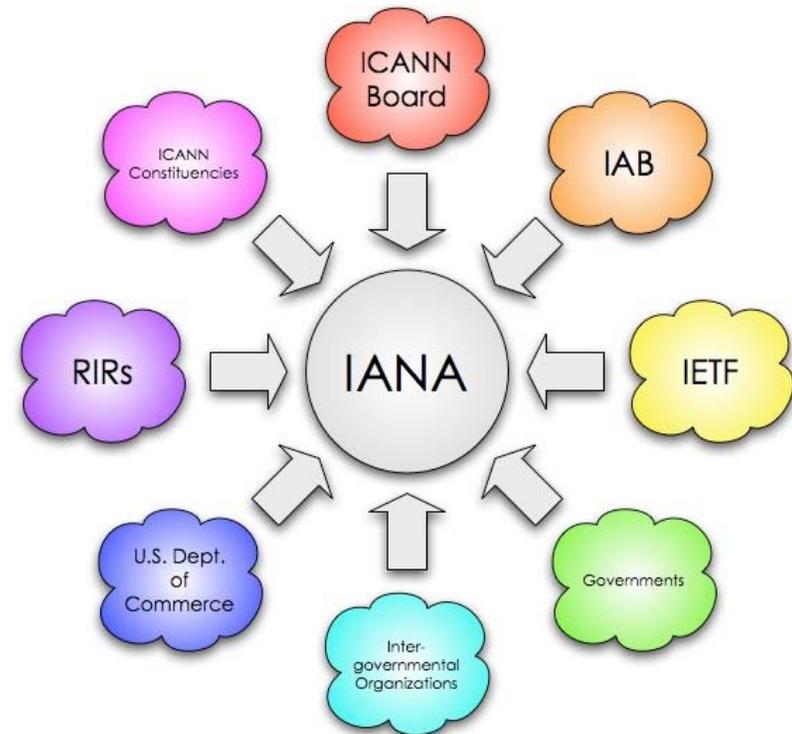
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- ICANN's role is very limited, it is **not** responsible for most issues associated with the Internet, such as financial transactions, Internet content control, spam, Internet gambling, or data protection and privacy.
- ICANN is responsible for domain names in the DNS root (and some infrastructure domains), top-level IP address allocations to the RIRs and for the IETF, and IETF-related protocol registries
- Conceptually, ICANN is a meeting place for constituencies and stakeholders interested in Internet unique identifier governance

Internet Assigned Numbers Authority (IANA)



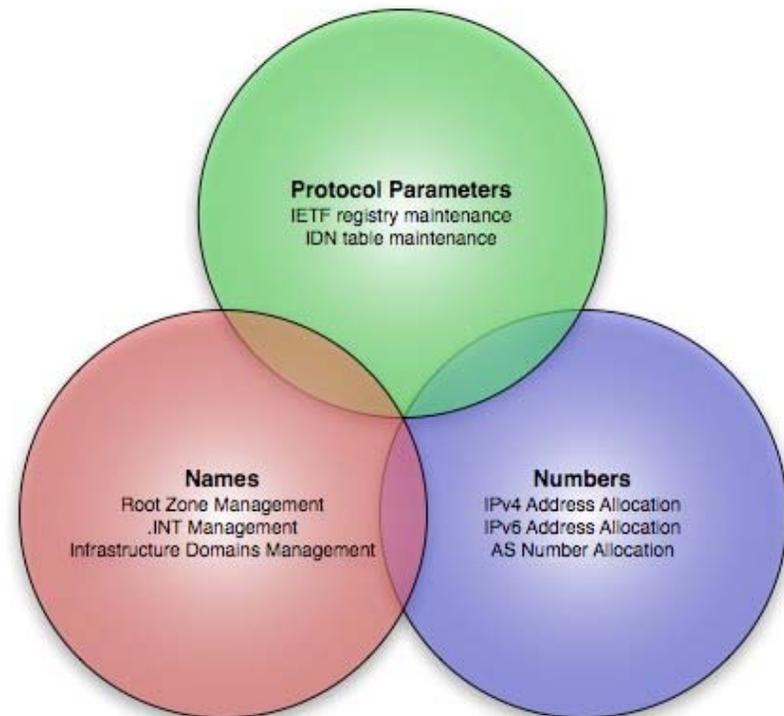
- Historically:
 - Created in the early 1970s
 - A centralized registry for numbers, names, and other values defined by the IETF
- Now:
 - A set of operational tasks defined by policies created elsewhere
 - E.g., IETF, ISO, RIRs, etc.
 - A function of ICANN
 - An activity defined by contract with the U.S. Department of Commerce



IANA's Role



- 3 major tasks
 - Root Zone Management
 - Assignment of “Technical Protocol Parameters”
 - Allocation of IP addresses
- A variety of minor tasks
 - .INT registry/registrar
 - Registry/registrar for Internet infrastructure domains (e.g., .ARPA)
 - Maintain Internationalized domain name language tables



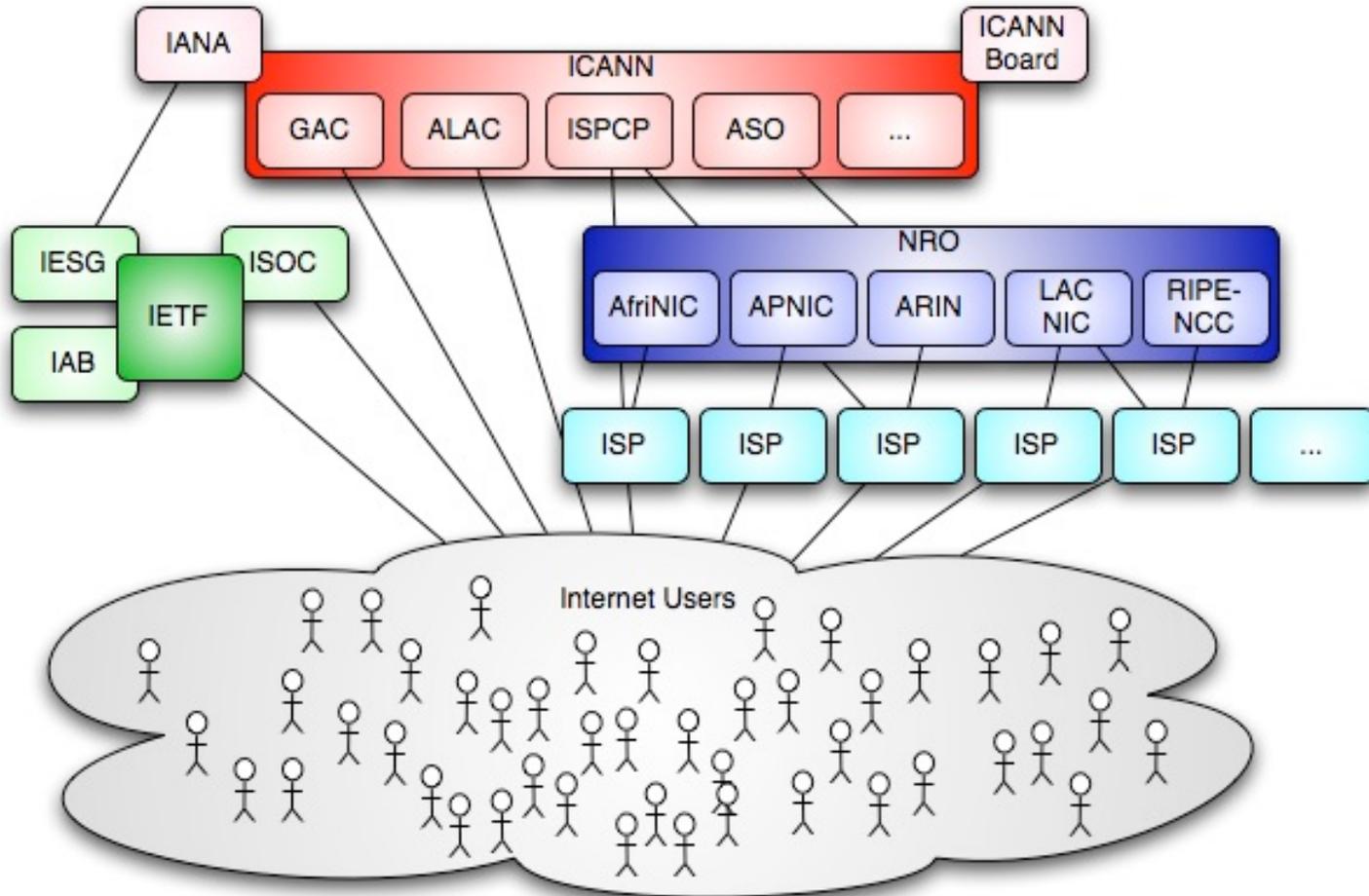
IP Address Allocation

- Originally, IANA assigned addresses directly
 - Day-to-day address allocation handled by “The NIC”
 - First, SRI-NIC (via (D)ARPA contract), later InterNIC (via NSF Contract)
- Around 1992, the RIRs started to be formed
 - Regional decentralization of “The NIC”
- Today, IANA allocates primarily to the RIRs
 - Very occasionally allocating according to IETF specifications

Address Allocation Policies

- Defined in RIR “Public Policy” fora
 - Anyone can propose a policy in any region
 - How the policy is accepted depends on the RIR
- IANA implements these policies after acceptance by ICANN
 - ICANN has a “Memorandum of Understanding” with the body that encompasses all RIRs, the Numbers Resources Organization (NRO)
 - Part of this MoU defines the process by which addressing policies are promulgated.

Organization Relationships in Internet Resource Policy Definition



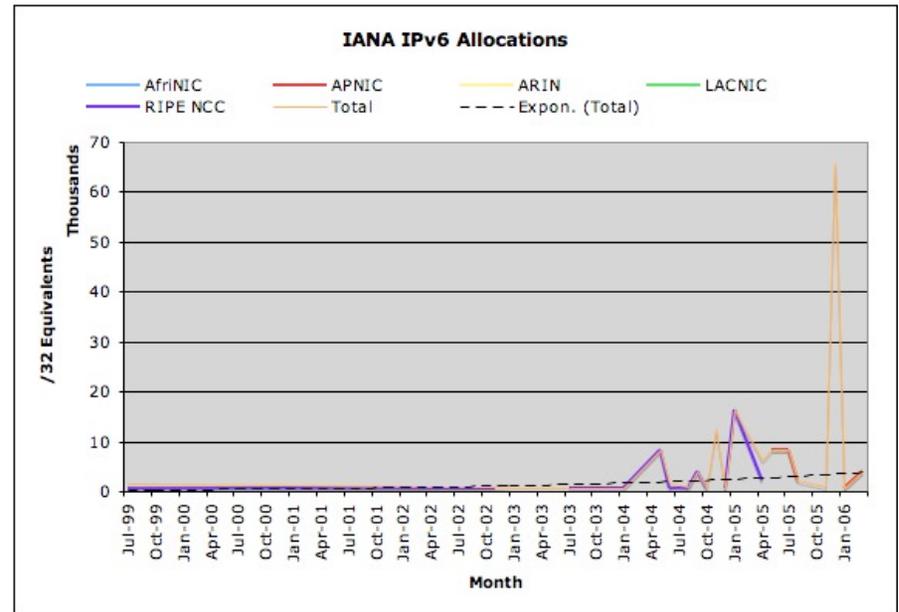
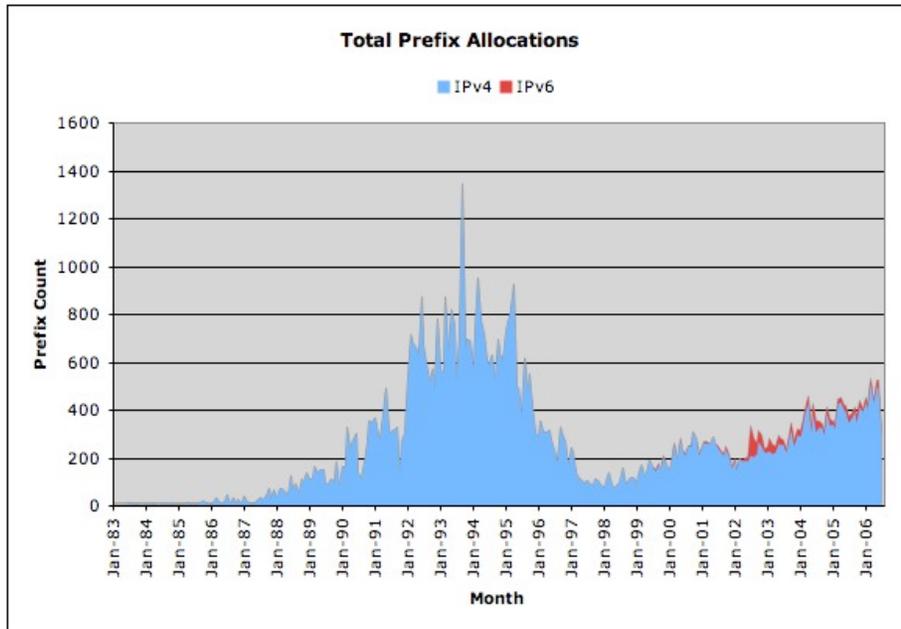
Some IPv6 Metrics



“Space is big. You just won't believe how vastly, hugely, mind-bogglingly big it is.”
 -- Douglas Adams, “HGTTG”

Metric	IPv4	IPv6
Addresses	4,294,967,296	340,282,366,920,938,463,463,374,607,431,768,211,456
Max RIR Blocks	256	512 (4,096)
1 block as % of total space	0.39%	0.19% (0.02%)
Max addresses in 1 RIR Block	16,777,216	83,076,749,736,557,242,056,487,941,267,521,536
Max subnets in 1 RIR Block	16,777,216	45,035,996,273,70,496
Min objects in 1 subnet	1	18,446,744,073,709,551,616
ISP blocks in 1 RIR Block	8,192	1,048,576
End user blocks in 1 ISP Block	2,048	65,536

IPv6 Block Allocations

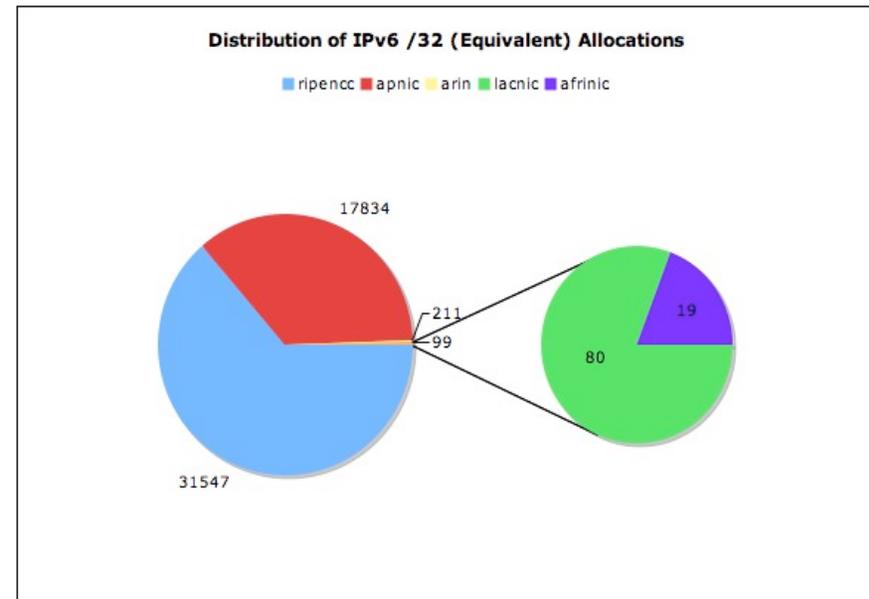
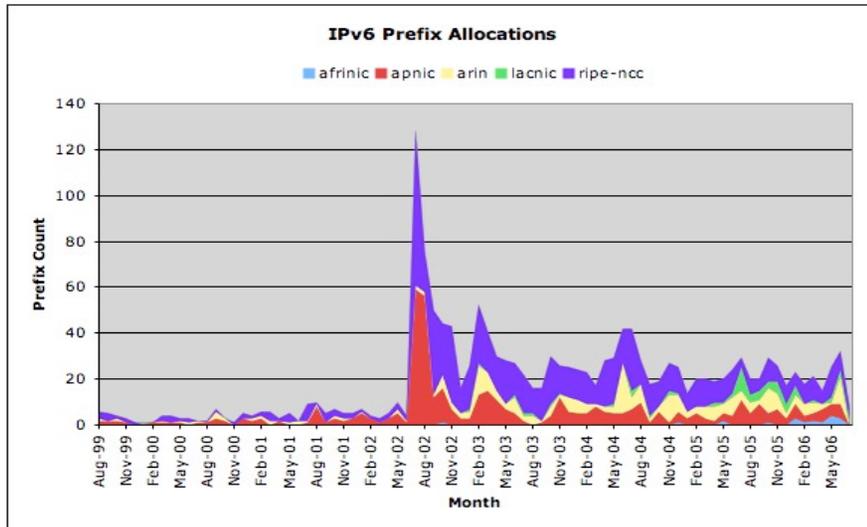




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IPv6 Allocation Distribution



Timeframe with Arguably Silly Assumptions



- Assume:
 - All RIRs request new blocks every 18 months
 - Arguably silly assumption since to date, total allocations for all RIRs combined is equivalent to approximately 5% of a **single** RIR block
 - Assumption of current Global IPv6 Policy
 - Linear growth (arguably silly)
- Then:
 - Current IETF assigned block for RIRs (1/8th total IPv6 space) will last until **2158**
 - Approximately 7/8th of IPv6 space still unused at that time

Summary



- IETF defines IPv6 protocol standards
- RIR communities define allocation policies
- Network Operations fora define operational “best practices”
- ICANN is responsible for a very limited set of functions associated with Internet unique identifiers
- IANA is the operational arm of ICANN, implementing policies defined by its constituencies
- RIRs allocate IPv6 addresses under community-defined policies
- There is a ridiculous amount of IPv6 space